ence in the succession of positions of the bars, difference of time allowed for rest, difference in the violence of the blows, &c.

The principal results appear to be the following:—

1. The greatest amount of magnetism which a bar can receive, appears to be such as will produce (on the average of bars) a compass-deviation of about 11°, the bar being 5 inches below the compass. It was indifferent whether the bars rested on stone or on wood, or whether they were struck with iron or with wood, the bars lying on the dip plane while struck.

2. When the bars, thus charged, lay on the plane transverse to the dip, they lost about one-fifth of their magnetism in one or two days, and lost very little afterwards.

3. When the charge of magnetism is smaller than the maximum, the diminution in a day or two is nearly in the same proportion as for the maximum.

4. The effect of violence on the bars, when lying on the plane transverse to the dip, is not in all cases to destroy the magnetism completely, sometimes it increases the magnetism.

5. The Cold-Rolled Iron receives (under similar violence) or parts with (under similar violence) a greater amount of magnetism than the Hot-Rolled Iron, in the proportion of 6 to 5.

6. There is some reason to think that the Hot-Rolled Iron has a greater tendency to retain its primitive magnetism than the Cold-Rolled Iron has.

7. There is some reason to think that, when lying tranquil, the Hot-Rolled Iron loses a larger portion of its magnetism than the Cold-Rolled Iron loses in the same time.

IV. "On the Analytical Theory of the Conic." By Arthur Cayley, Esq., F.R.S. Received May 8, 1862.

(Abstract.)

The decomposition into its linear factors of a decomposable quadric function cannot be effected in a symmetrical manner otherwise than by formulæ containing supernumerary arbitrary quantities; thus, for a binary quadric (which of course is always decomposable) we have

$$(a, b, c \between x, y)^2 = \frac{1}{(a, b, c \between x', y')^2} \text{ Prod. } \{(a, b, c \between x, y \between x', y') \pm \sqrt{ac-b^2}(xy'-x'y)\};$$

or the expression for a linear factor is

$$\frac{1}{\sqrt{(a, b, c \between x', y')^2}}\{(a, b, c \between x, y \between x', y') \pm \sqrt{ac-b^2}(xy'-x'y)\},$$

which involves the arbitrary quantities (x', y'). And this appears to be the reason why, in the analytical theory of the conic, the questions which involve the decomposition of a decomposable ternary quadric have been little or scarcely at all considered: thus, for instance, the expressions for the coordinates of the points of intersection of a conic by a line (or, say, the line-equations of the two ineunts), and the equations for the tangents (separate each from the other) drawn from a given point not on the conic, do not appear to have been obtained. All these questions depend on the decomposition of a decomposable ternary quadric, which decomposition itself depends on that for the simplest case, when the quadric is a perfect square. Or we may say that in the first instance they depend on the transformation of a given quadric function $U=(* \between x, y, z)^2$ into the form W^2+V, where W is a linear function given, save as to constant factor (that is, $W=0$ is the equation of a given line), and V is a decomposable quadric function, which is ultimately decomposed into its linear factors, $=QR$, so that we have $U=W^2+QR$. The formula for this purpose, which is exhibited in the eight different forms I, II, III, IV, I(bis), II(bis), III(bis), IV(bis), is the analytical basis of the whole theory, and the greater part of the Memoir relates to the establishment of these forms.

It will be sufficient for the present abstract to quote one only of these forms, viz.,

$$\text{I.}\quad (a, \ldots \between x, y, z)^2 = \text{Quotient by } (a, \ldots \between x', y', z')^2 \text{ of}$$

$$\left[\begin{array}{l} [(a, \ldots \between x, y, z \between x', y', z')]^2 \\ + \text{Quotient by } (A, \ldots \between mz'-ny', \ldots)^2 \text{ of Product} \\ \left\{ (A, \ldots \between mz'-ny', \ldots \between yz'-y'z, \ldots) \pm \left|\begin{matrix} x, & y, & z \\ x', & y', & z' \\ l, & m, & n \end{matrix}\right| \sqrt{-k(a, \ldots \between x', y', z')^2} \right\} \end{array}\right.$$

where the notation (which is of course explained in the Memoir) will, I think, be understood without difficulty, and I do not stop to explain it here.

The solution of the geometrical questions above referred to is, as

shown in the Memoir, involved in and given immediately by these forms. It is also shown that the formulæ are greatly simplified in the case *e. g.* of tangents drawn to a conic from a point in a conic having double contact with the first-mentioned conic, and that in this case they lead to the linear automorphic transformation of the ternary quadric. The Memoir concludes with some formulæ relating to the case of two conics, which, however, is treated of in only a cursory manner.

May 22, 1862.

Major-General SABINE, President, in the Chair.

The following Gentlemen were proposed by the Council for Election as Foreign Members, and it was announced that they would be balloted for at the next Ordinary Meeting of the Society, viz.:—

César Mansuete Despretz, of Paris.
Franz Ernst Neumann, of Königsberg.
Ernst Heinrich Weber, of Leipsic.

The following communications were read:—

I. "Letter to the President from Mr. William Lassell, F.R.S., dated Malta, May 13, 1862, giving an account of Observations made with his large Equatorial Telescope." Received May 22, 1862.

9 Piazza Stierna, Malta,
May 13, 1862.

Dear General Sabine,—I have ventured to think that a word of my proceedings may be acceptable to you, though I have been much more tardy in getting into observing order than I had expected. It is indeed only now that I am able to make observations without finding some one part or other of my apparatus capable of improvement. At length, however, I find my hopes exceeded in the perfection, precision, and facility with which my colossal equatorial is directed and carried on: the driving motion is indeed as perfect and uniform, I believe, as that of any telescope with which I am acquainted. For the luxury of observing two assistants are necessary,